

Remarks

The application has been reviewed in light of the Office Action mailed September 25, 2002. By the foregoing Amendment, claims 1-12 have been amended. No new matter is introduced by the Amendment. Entry of the Amendment and favorable consideration thereof is earnestly requested.

The Examiner has objected to the specification due to certain informalities. These informalities have been corrected by the foregoing Amendment.

The Examiner has objected to claims 1-12 due to certain informalities. These informalities have been corrected by the foregoing Amendment.

The Examiner has rejected claims 1-12 under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 1-12 have been amended to overcome this rejection.

The Examiner has rejected claims 1 and 7-12 under 35 U.S.C. §102(b) as being anticipated by Kratsch et al. (U.S. Patent No. 5,490,861).

Kratsch et al. discloses an end effector for endoscopic instruments, which includes a push rod displaceable by a hand manipulator arranged on a proximal end of the push rod for activating remote tool parts at a distal end of the push rod, and including a force-limiting device for limiting the transmission of force to said remote tool parts from said hand manipulator via the push rod.

The force-limiting device of Kratsch et al. is designed as spring coil section (12) which is arranged on the outer surface of push rod (16) (Col. 5, lines 44-47 and Fig. 2). The push rod (16) and the spring coil section (12) are coupled to one another allowing a reciprocal movement of the push rod (16) to the spring coil section (12). The

force-limiting device of the assembly known from Kratsch et al. is designed by these two elements, the push rod (16) on the one hand and the spring coil section (12) on the other hand.

Contrary to the above-described assembly of Kratsch et al., the force-limiting device of the claimed invention particularly requires that "said push/pull rod itself is designed to form said force-limiting device having spring-like elasticity along the line of displacement." (See Claim 1, together with related descriptions.) Accordingly, the medical instrument as recited in claims 1 and 7-12 is patentably distinct from Kratsch et al. Further, the invention as claimed is not obvious from Kratsch et al., because a person skilled in the art does not get any hint from Kratsch et al. to combine the push rod (16) and the spring coil section (12) in a single element to form the force-limiting device.

The Examiner has rejected claim 1 under 35 U.S.C. §102(b) as being anticipated by Moslor et al. (U.S. Patent No. 4,122,856).

The force-limiting device known from Moslor et al. is designed as tubular sheath (16) which has a passage (17) extending there-through. An actuation rod (31) extends through this passage (117) of said sheath (116) (Col. 4, lines 22 - 24 and Fig. 3). The sheath (16) can be designed flexible so that it might be flexed or directed by a deflecting bridge used in conjunction with a cystoscope (Col. 3, lines 37 - 46).

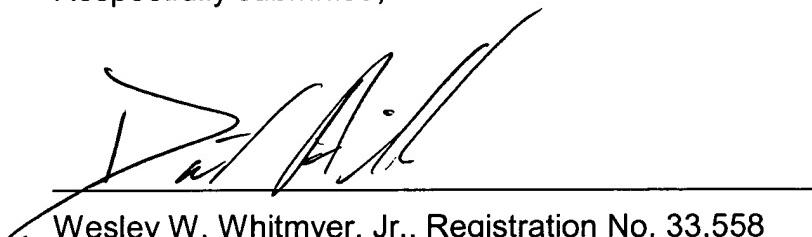
As is similar to Kratsch et al., the force-limiting device of the instrument known from Moslor et al. is designed by an element sheath (16) (together with other members such as spring (29)) separate from the actuation rod (31), whereas the present invention claims that, said push/pull rod itself is designed to form said force-limiting device having spring-like elasticity along its longitudinal length. Accordingly, the medical instrument as recited in claim 1 is patentably distinct from Moslor et al.

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Therefore, from the teaching of either Moslor et al. or Kratsch et al., and/or even in view of a combination of Kratsch and Moslor, it was not obvious for a person having ordinary skill in the art to modify a known force-limiting device in the inventive way because there cannot be found any indication in the cited prior art to combine the push/pull rod and the spring coil section or the flexible sheath in a single element to form the force-limiting device. Therefore a medical instrument according to amended patent claim 1 is patentable over the cited references.

Applicant gratefully acknowledges that the Examiner has indicated the allowability of claims 2-6 if rewritten to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, as discussed above, and to include all of the limitations of the base claim and any intervening claims. Applicant respectfully submits that all of the claims currently pending in the application are now in accordance with the foregoing suggestions by the Examiner and in condition for allowance. Early notice to that effect is respectfully requested.

Respectfully submitted,



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Version with Markings to Show Changes Made

In the Specification:

Please replace page 1 with the following, including substitution of the title of the invention:

A MEDICAL INSTRUMENT HAVING A FORCE-LIMITING DEVICE [A medical instrument, particularly a surgical instrument]

Background of the Invention

The invention relates to a medical instrument, particularly a surgical instrument with a displaceable push/pull rod arranged on the proximal end of a hand manipulator for activating remote tool parts on the distal end, wherein a force-limiting device is envisaged for limiting the transmission of force from the hand manipulator onto the remote tool parts via the push/pull rod.

Field of the Invention

This kind of medical instrument can for example be a needle holder, a gripping-, holding- or preparation tool, scissors or other instrument, in which the push/pull rod can be moved back and forth using manual force via the hand manipulator, in order to move, i.e. to open and close, the remote tool parts which are predominantly open-ended tool parts.

Description of the Related Art

These known medical instruments available in various embodiment configurations have a long hollow cylindrical shaft, onto the distal end of which the remote tool parts are arranged. The hand manipulator with a rigid handle element and a swivelling handle element is arranged on the proximal end of the shaft. To activate

the remote tool parts via the hand manipulator, the remote tool parts and the swivelling handle element of the hand manipulator are coupled via the push/pull rod which is located in the hollow cylindrical shaft. In this way it is possible to open and close the remote tool parts by counter-adjusting.

Please replace page 3 with the following:

In order to avoid undue excess forces being exerted onto the push/pull rod via the hand manipulator and therefore onto the remote tool parts, a force-limiting device is known in the practical field in which the transmission of force between the hand manipulator and the push/pull forces and/or the remote tool parts is limited by a force-limiting device. This type of force-limiting device is known for example from DE 197 31 453-C2. With this known device the push/pull rod is designed as a two-piece component, in which both the push/pull rod sections are connected to one another by way of a force-limiting device. One section of the rod is designed with a casing comprising an internal steepening flat body wedge across the direction of movement of the push/pull rod. The other rod section has a tapered cone with a corresponding flat body wedge, which is located inside the casing of the first rod section. The casing is designed with slots which are expanded by the displaceable tapered cone along the flat body wedge of the casing upon being subjected to tensile pressure of the push/pull rod, through which a portion of the closing force generated is absorbed, so that no further undue excess pressure can be exerted onto the remote tool parts.

In accordance with another known embodiment configuration the force-limiting device is designed as a spring assembly on the proximal end of the push/pull rod and which absorbs a portion of the force transmitted onto the push/pull rod via the hand manipulator.

All these state of the art known force-limiting devices have indeed proven themselves in practice, however their construction is very complicated and time consuming and therefore expensive.

Summary Of The Invention

Moving on from this the invention is based on the exercise of improving a medical instrument of the above mentioned...

Please replace page 5 with the following:

...the undulating force-limiting device are offset at 90° or 135° from one another.

The spring-like elasticity of the push/pull rod can in one configuration of the invention be adjusted through its shape and the number of undulatory curves go that it is possible for the force-limiting device to be adapted to the respective necessary and appropriate closing pressure.

A second embodiment configuration of the invention suggests that the push/pull rod be designed with at least sectional turned spiral coils to provide the spring-like elasticity. Along with the creation of the undulatory curves, the spiral coil configuration of the push/pull rod offers the opportunity for the push/pull rod to flexibly elongate itself in the event of excess tensile pressure.

With this embodiment configuration the spring-like elasticity of the push/pull rod is preferably adjusted through the gradient of the turned spiral coil sections, in which the turned spiral coil sections preferably have a large gradient.

Finally the invention suggests that the spring-like elasticity of the push/pull rod can be adjusted by way of the material used for the push/pull rod.

Further, for technical and production reasons as well as for increasing operational safety, it is suggested that the push/pull rod be made of one uniform piece of material and/or with a virtually constant cross section.

Brief Description Of The Drawings

Further characteristics and advantages of the invention can be extracted from the following description of the associated diagram, in which the one embodiment configuration for creating a force-limiting device for a...

Please replace page 6 with the following:

...medical instrument according to the invention is depicted. The diagrams show:

- Fig 1 is a side view of a surgical instrument according to the invention in the form of a gripping tool.
- Fig 2 a side view of a force-limiting device of a medical instrument per Fig 1 with undulatory curved sections, and
- Fig 2b a side view of the force-limiting device per Fig 2a, however rotated 90°.

Detailed Description Of The Invention

Fig 1 depicts a surgical instrument in the form of a gripping tool 1. The gripping tool 1 has a hollow cylindrical shaft 2 along its lateral length, on the proximal end of which a hard manipulator 3 is located, and on the distal end of which remote tool parts 4 are arranged in the form of two open-ended sections and which can be activated via the hand manipulator 3 of the gripping tool 1.

The remote tool parts 4 are designed so that one remote tool part 4a is rigidly connected to the shaft 2, whilst the other remote tool part 4b is located and can swivel

on an axis 5 across from the rigid remote tool part 4a. Understandably it is also possible for both remote tool parts 4 to be designed to swivel.

The hand manipulator 3 for activating the remote tool parts 4 has two handle elements 3a and 3b which swivel on hinge axes 6 across from the shaft 2.

The connection between the hand manipulator 3 - more precisely the swivelling handle elements 3a and 3b of the hand manipulator 3 - and the swivelling remote tool parts...

In the Claims:

Please amend claims 1-12 as follows:

1. (Amended) A medical instrument [, particularly a surgical instrument,] comprising [with] a push/pull rod displaceable by a hand manipulator arranged on a [the] proximal end of said push/pull rod for activating remote tool parts at a [the] distal end of said push/pull rod, said medical instrument further comprising [wherein] a force-limiting device [is] envisaged for limiting the transmission of force onto said [the] remote tool parts from said [the] hand manipulator via said [the] push/pull rod, wherein [characterized in that] said push/pull rod itself is designed to form said force-limiting device having spring-like elasticity along the line of displacement [for creating the force-limiting device the push/pull rod is designed to have spring-like elasticity along its lateral length].
2. (Amended) A medical instrument according to claim 1, [characterized in that the] wherein said push/pull rod is designed to have [has] at least sectional undulatory curves to provide said [the] spring-like elasticity.
3. (Amended) A medical instrument according to claim 2, [characterized in that the] wherein said individual sections with the undulatory curves are designed on planes offset from one another.

4. (Amended) A medical instrument according to claim 3, [characterized in that the] wherein said individual sections with the undulatory curves are each designed on planes offset at 90° from one another.
5. (Amended) A medical instrument according to claim 2, [characterized in that the] wherein said individual semi-curves of said [the] sections with the undulatory curves are designed to be offset at 90° or 135° from one another.
6. (Amended) A medical instrument according to claim 2, [characterized in that] wherein the spring-like elasticity of said [the] push/pull rod can be adjusted through its shape and/or the number of the undulatory curves.
7. (Amended) A medical instrument according to claim 1, [characterized in that the] wherein said push/pull rod is designed with at least turned spring coil sections to provide the spring-like elasticity.
8. (Amended) A medical instrument according to claim 7, [characterized in that] wherein the spring-like elasticity of said [the] push/pull rod can be adjusted through the gradient of said [the] turned spring coil sections.
9. (Amended) A medical instrument according to claim 7, [characterized in that the] wherein said turned spring coil sections have a large gradient.
10. (Amended) A medical instrument according to claim 1, [characterized in that] wherein the spring-like elasticity of said [the] push/pull rod can be adjusted via the material of said [the] push/pull rod.
11. (Amended) A medical instrument according to claim 1, [characterized in that the] wherein said push/pull rod is made from one uniform piece of material.
12. (Amended) A medical instrument according to claim 1, [characterized in that the] wherein said push/pull rod has a virtually constant cross section.